Popular Science

By Rene Bache

What Colors to Wear

TASTE in matters of dress is possessed in high degree by relatively few women. In some men it is as noticeably developed as in any person of gentler sex, even as regards women's clothes. They know, somehow.

But in either sex it is an exceptional gift. Many suffer from a disastrous lack of it, not even knowing how to put colors together suitably, or—what is a more important thing—to choose the colors that are becoming to themselves and to avoid those that are unbecoming.

Hence, the value of a chart newly issued by the Iowa State College, which reduces the whole question of color becomingness to a scientific basis. All a woman has to do is to look at the following table, and she knows what she ought and oughtn't to wear.

Blond

Fair blond—(Creamy pink skin, blue eyes, light golden hair).

Colors advised—Green, rose, light blue, dark blue, cream white, gray and black.

Colors to avoid—Red, orange, yellow, purple, yellow and brown.

Ruddy blond—(Gray, green or brown eyes, auburn hair, bright, clear skin).

Colors advised—White, green, blue, gray-blue, fawn color, black, neutral and broken colors.

Colors to avoid—Violet, red, orange and yellow.

Brunette

Pale brunette—(Pale skin, dark eyes, brown or black hair).

Colors advised—Cream white, brown, claret, deep russet, crimson, old rose and gold color.

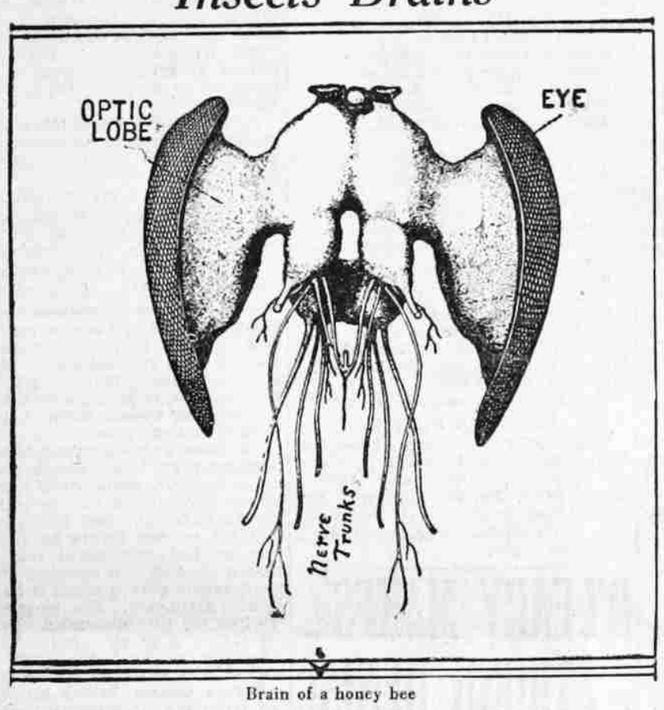
Colors to avoid—White, pink, black, deep blue, all light tones of blue; light or bright green, pale violet or purple.

Florid brunette—(Olive skin, brown or black eyes, jet or blue-black hair).

Colors advised—Rich maize, yellow, deep gold, orange (sparingly), dark red, maroon, dark blue or cream white.

Colors to avoid—Light blue, light green, pale violet, violet, pink or purple.

Insects' Brains



Brain of a honey bee

AN OBJECT of some popular interest in the National Museum at Washington is a model representing the brain of a mosquito magnified 1000 times.

The efficiency of a brain as a thinking apparatus is not measured by its size. Thus the brain of an elephant is much bigger than that of a man, but the pachyderm's intelligence does not compare favorably with that of the human animal.

The mosquito is intellectually rather well developed. Anybody who does not think so must have escaped acquaintance with the Jersey variety. There are also others.

The housefly is a clever brute. Like the mosquito, it knows a whole lot of things from the minute it comes into the world—in particular, the fact that man is its determined and remorseless enemy. It acts, as all of us have had opportunity to observe, accordingly.

The nervous system of a housefly (and the same is true of a mosquito) is a cord with nerve knots (ganglia) strung along it. The biggest of these ganglia is in the upper part of the head, and may properly be called the brain.

The head ganglion, by nerve filaments, controls the eyes, mouth and antennae.

This is not so different from the human arrangement as might be imagined. Your own brain is merely a big ganglion at the top end of your spinal cord, and your skull is nothing but a much-enlarged vertebra made to house it. It is upon the ganglia strung along your spinal cord that you depend for the muscular movements of your body.

Fishes That Carry Lanterns

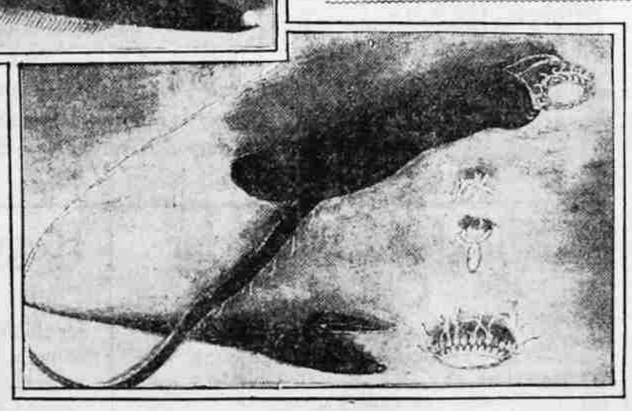
Pelican fish

UP TO within very recent years it was believed that the depths of the sea were uninhabited by any living creatures. But it is now known that the marine abysses have a fauna of their own, consisting of animal species wholly unfamiliar to us.

Among these animals are many kinds of fishes, most weird and strange—for instance, sharks that in shape resemble huge eels. A striking finny type is the "black swallower," which spends its time buried in the shelly ooze of the bottom. It is nearly all mouth, and gets a living by waiting for prey to walk into its cavernous jaws.

Another species is able literally to swallow fishes ten times as big as itself, its jaws being enormously distensible, so that it climbs around the victim, so to speak, and envelops it. In general, the fishes of the ocean depths are black, and either blind or else provided with huge eyes to catch every ray of light.

The marine abysses are a region of total and absolute darkness. But this darkness is illuminated by the phosphorescent torches which the fishes and other creatures carry. Even the jellyfishes are luminescent, and at moderate depths the bottom is covered over wide areas with seafans and other animal growths that, counterfeiting plants, bear their own lights.



Deep-sea fishes feeding

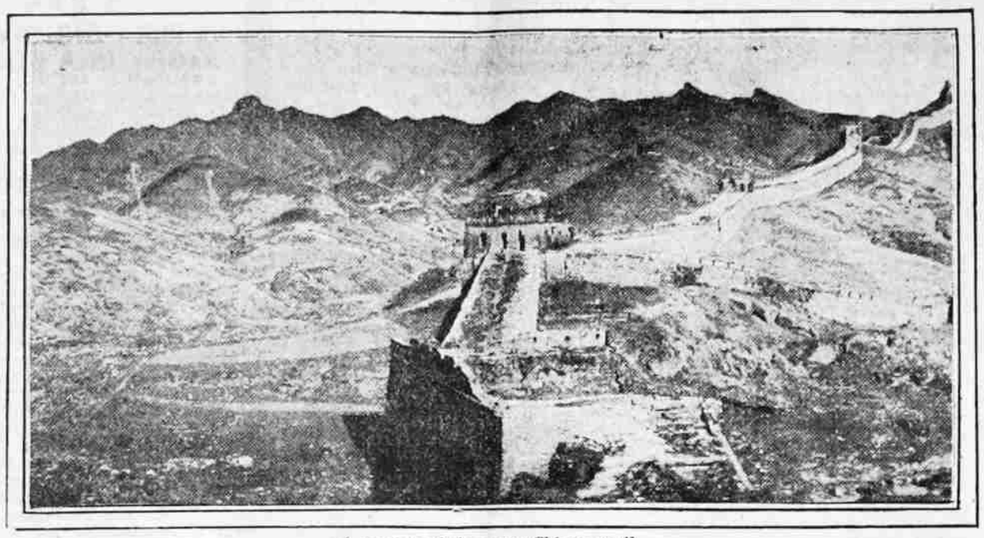
One understands, then, why the depth-fishes (when not wholly blind) have such great eyes. Some of them also carry lanterns, seemingly designed to help them in looking for prey. These lanterns, in some species, are constructed much like eyes, with a lens, a nerve entering at the back like the optic nerve, and even a muscular arrangement for turning the lantern this way and that.

A species named by the scientists Argyropelecus has more than two-score such lanterns, each of which is provided with a brilliant reflector. They are veritable bullseye lamps, with double-convex lenses of crystal-clear substance. To make each reflector more efficient, there is behind it a layer of black pigment, which, in fact, envelops the whole of the globular-shaped lantern, just as is the case with a human eye.

Another species of fish has on either side of its head a double lamp, with reflectors, the two pointing different ways. That is to say, one pair of lanterns points ahead, like the lamps of an automobile, while the other pair is directed downward to illuminate the bottom over which the fish is passing.

The lanterns carried by the abyssal fishes give lights of different colors—silvery, golden or greenish. They must lend to the scenery of the ocean depths a weird and wonderful effect.

Wonders of the Great Wall of China



A portion of the great Chinese wall

BY FAR the greatest work of military preparedness ever undertaken was the Great Wall of China, which was finished about 2200 years ago.

It was also, beyond comparison, the greatest engineering work ever accomplished. Compared with the Great Wall, the Pyramids of Egypt, all of them put together, are of insignificant importance.

Consider the figures. The Great Wall (built throughout of rubble faced with cut stone) was—and is today, as it stands—about 2000 miles long. It is thirty-five feet high and thirty feet thick at the base, slanting slightly from bottom to top.

It starts (from the eastern end) at Shan-hai-huan, on the Gulf of Chih-li, and runs almost directly west 150 miles to a point not far north of Pekin. There it splits into two walls, one of them following the crest of the West Hills down into the province of Shansi, where it makes another split, a branch running westward toward Thibet.

The system is too complex, however, for description without an accompanying map. It may be said in a general way that the Great Wall runs from northeast to southwest. There is an outer wall and an inner wall, the latter being of later construction and today in better repair.

The object of the wall was to keep out invaders from the north. From our viewpoint today it may seem absurdly ill-adapted for such a purpose. But this is a mistaken idea. At the period when it was new, the Great Wall was an admirable fortification, wisely contrived.

Why should not an army of invaders from the north find it easy to climb over the wall—to make a breach in it if necessary, and march through? There were several reasons, but in order to understand them we must realize military conditions as they were 2200 years ago.

Then (as now) a military force of great size could not move without immense quantities of supplies. In the absence of better means of transport, these supplies had to be carried on the backs of men. The transport trains could not cross rugged mountains; hence they must proceed through one or another of a few openings in the hills—in other words, through the passes.

Now wherever the Great Wall blocked a pass, it was strengthened by supplementary fortifications. At the entrance there were outlook citadels, susceptible of formidable defense. Further along, the invaders would find themselves barred by heavily manned bastions. Then they would come to an outer wall, which they must surmount before reaching the Great Wall proper.

Here were strong defenses indeed. But it was no use to try to find a way around them because of the insuperable difficulties of transport. The Great Wall fulfilled its purpose, and for many centuries proved an effective bar against invasion by the barbarian hordes from the north.

True, a marauding party might get over the wall. That often happened. But it was a matter of small importance. Such a party could not lead an invasion. Elsewhere than at the passes, the wall was lightly held by a few troops.

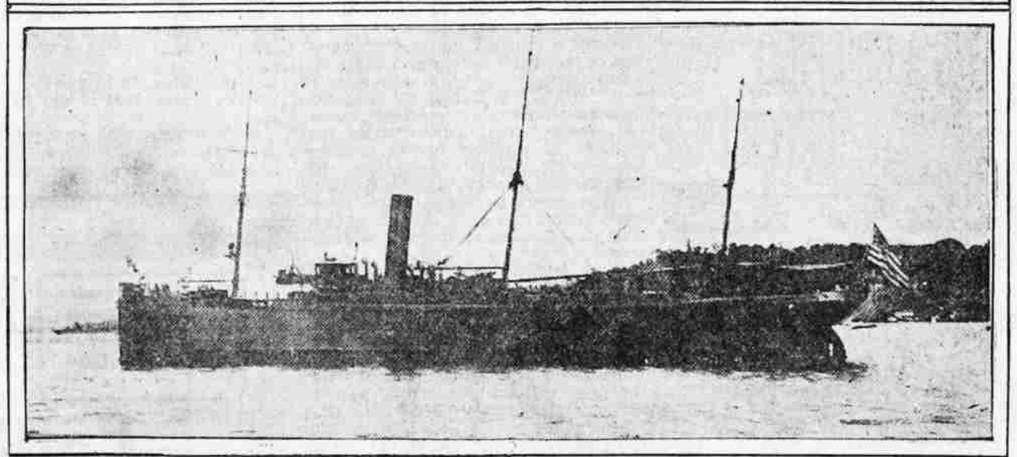
The Great Wall was so well built that it is in a fair state of preservation today. To look upon it excites amazement. Over high mountains and across rivers it runs, the greatest monument to human engineering achievement.

Along the top is a parapet for the protection of defenders, with openings through which to discharge stones or arrows. At frequent intervals are towers, affording points of advantage in case of attack.

The most vulnerable point in the Great Wall, from a strategic point of view, was the Nankow Pass, forty miles to the northwest of Pekin. It was in its day a marvel of engineering. Back of the outlook citadels were second and third-line defenses before the wall itself could be reached, with high stone barriers running up the hills on either side.

Eventually the Tartars from the north got in through the Great Wall. But how? They were invited in, to help China fight intruding hordes of Mongols. And having arrived, they stayed and proceeded to run and rule the country.

Cold Storage of the Seas



United States supply ship Culgoa

A FIRST-CLASS battleship today carries more than 1000 enlisted men and officers. Lighted by electricity and provided with every modern convenience, it is, in point of equipment for living purposes, hardly less luxurious than the most modern hotel.

Its kitchens, always spick and span, with tiled walls and copper pots and other utensils brilliantly polished, are comparable to those of a big hotel. All the cooking is done by electricity, and the same "juice" furnishes power for all sorts of culinary processes, from kneading the bread dough to peeling the potatoes.

There is even a butcher shop on board, with three or four experts in charge, who cut up and prepare the meats for cooking. Of course, they deal only with carcasses—beef animals, lambs, pigs and poultry—which are delivered to them whole.

A dreadnought, such as our Pennsylvania, has two "flour rooms" that contain nothing but flour. It has separate storage rooms for coffee, for tea, for tinned vegetables, for tinned meats, etc. In warm weather fresh vegetables are stowed in great wire cages on the superstructure deck, where they have plenty of light and air. When frost threatens, the cages are covered with tarpaulins.

With so many mouths to feed it is obvious that no warship could get along without frequent renewal of its food supplies. But to put into a seaport for the purpose would lose too much time. Accordingly, a solution of the difficulty has been reached by providing so-called "supply ships" to accompany a fleet.

We have such supply ships now in European waters. They are as indispensable as colliers. And, just as the colliers furnish coal to the fighting craft at sea, so do the supply ships bring food. Ordinarily a battle fleet has attached to it two supply ships, which join the fleet at regular intervals, at places previously appointed. When one of them is empty it goes away to fill up, and the other arrives to take its place.

A supply ship is a huge cold-storage plant afloat. It contains a refrigerating outfit more than a dozen times the size of that of the Waldorf-Astoria Hotel, in New York. Most of the interior space is taken up by compartments for the storage of meats, fresh vegetables, eggs, butter and other perishable stuff.

Such a vessel may carry 1,000,000 pounds of fresh meats and 800,000 pounds of fresh vegetables—the latter kept at a temperature averaging about 40 degrees. She has separate compartments for nonperishable food materials, such as hams and bacon, dried beans and peas (in sacks), dried vegetables and fruits (in boxes), evaporated milk (in cans), tinned vegetables and fruits, flour, sugar and other kitchen necessaries.

All of the business of food supply for the navy is managed and directed from the office of Paymaster General McGowan, in the Navy Department at Washington. There all the contracts are signed for the purchase of food materials—the money figures at the present time, of course, running up to enormous sums—and all estimates are made, the basis of the latter being simple enough. It takes just so much to feed 1000 men for thirty days (the total being split into items to match the lawful ration), and the requirement for 100,000 or 500,000 is merely a multiple of that.

Fuel of the Future

"AT NO distant day an entirely new system of fuel utilization will be adopted in this country," said Dr. Joseph E. Pogue, of the Smithsonian Institution. "The entire coal supply of each city or town will be delivered to a central municipal plant, which will attend to the business of its distribution.

"But nobody will get any 'raw.' All of it will be put through a process by which the fuelstuff that it contains will be separated out, for subsequent delivery to householders and other consumers, while certain valuable by-products are saved.

"Anthracite will soon be regarded as a luxury for the rich. It will go up and up in price. Ordinary folks will have to content themselves with soft coal. The latter is an excellent fuel, but dirty. It gives off a dense black smoke that dirties the home, pollutes the atmosphere and menaces health.

"This is the one great disadvantage of bituminous coal. But it will be wholly done away with under the system that must before very long arrive. Either the fuelstuff that is in it will be converted into a smokeless artificial anthracite or an equivalent result will be attained by extracting all of this fuelstuff in the form of gas, for delivery to consumers through pipes.

"We object to the black smoke of bituminous coal, and no wonder. But what in reality is this smoke? Of what is it composed? The answer is that it contains most of the valuable ingredients of the coal. They pass off into the air and are lost forever.

"A short ton of bituminous coal, worth $1 at the mouth of the mine, contains $14 worth of useful commodities. These are, chiefly, 10,000 cubic feet of gas, twenty-two pounds of ammonia, two and one-half gallons of benzol and nine gallons of tar.

"Of late we have seen benzol mentioned often in print. It is a light oil that contains 'toluol'—a substance upon which modern warfare is absolutely dependent for the manufacture of explosives. Also, it yields dyes, drugs, medicines and a great variety of chemicals. It is a first-class motor fuel, furnishing a very satisfactory substitute for gasoline.

"Any city gas plant (taken over by the municipality) may at a future time be converted into and expanded into an establishment that will supply all the fuel the community consumes—partly in the form of gas, partly in the shape of artificial anthracite. Its mains and much of its other equipment will be retained, but, by a new system of coal distillation, all of the precious by-products will be saved.

"Artificial anthracite is not yet an accomplished fact, but undoubtedly it will soon arrive. Nature points the way. All anthracite was originally bituminous coal, but the volatile elements (so valuable) were forced out of it by pressure and heat. The problem is being worked out in the laboratories along these lines.

"It is entirely practicable, by means already familiar, to take all the fuelstuff out of bituminous coal in the form of gas. On the other hand, it may be advantageous to separate out the energy-producing portion of the coal in the shape of a solid equivalent to anthracite—a smokeless fuel utilizable in furnaces and in open fires. In either case the by-products could be saved.

"An advantage of solid fuel is that it requires no change in the present types of furnaces and grates. It would be available for use in suburban and outlying districts not reached by pipes. Factories and transportation lines could utilize it. Artificial anthracite would make cities and railroads smokeless.

"On the other hand, gas fuel eliminates storage and handling. It wholly does away with dirt, and, where gas-fired furnaces are concerned, it prevents (through automatic temperature control) the waste of fuel commonly incident to the amateur management of the coal-fed 'ogre in the cellar.'

"To sum the matter up, bituminous coal contains certain important values not hitherto utilized. If we can extract these values, the profit they represent should make the left-over fuelstuff much cheaper to consumers, while not a bit less productive of heat or power.

"This fuel (whether gas or artificial anthracite) will be smokeless. It will solve a vital domestic problem, and by the saving of the by-products of the coal (mainly represented by the much-objurgated smoke), the one disadvantage of the bituminous article will be turned into a substantial blessing."

What We Have Left to Burn

For every man, woman and child in the United States there have been dug from our mines twenty-eight tons of anthracite, while ninety tons remain underground.

Of bituminous coal there have been dug ninety tons, and 15,000 tons remain underground.

Thus we have mined and used much less than 1 per cent of the bituminous stock which must be our real ultimate dependence for fuel.

One ton of bituminous coal, worth $1 at the mouth of the mine, contains $14 worth of useful commodities—

10,000 cubic feet of gas
22 pounds of ammonia
2½ gallons of benzol
9 gallons of tar

Pigs and People

SO LIKE is the pig's eye to the human eye that fledgling oculists, learning their trade, practice all sorts of operations upon eyes of freshly killed swine, which are easily obtained from the market.

Even the skilled and highly trained ophthalmologist, when he wants to try out an idea—for instance, a new kind of operation for cataract (which means the removal of the crystalline lens)—will get a pig's eye and see how it works. If it succeeds, he tries it on a patient.

All the wonderful muscle-cutting operations, by which squint and other irregularities are so successfully remedied, were worked out originally by experiments with pigs' eyes.

Bees Built This Church

JUST to show what bees can do when they try, here is a church that they built. At all events, they furnished the materials.

Women, no doubt, are better churchgoers than men. Very likely they would attend even more regularly if the church was good to eat. This one is built of honey.

More accurately speaking, the walls are of honeycomb and the roof and upper part of the steeple are of beeswax comb foundation.

It is the only building ever constructed of such materials and might well attract a swarm of pious honey bees for a congregation.

Courtesy American Bee Journal

Honey church